

I.—*The Roman Baths at Bath ; with an Account of the Excavations conducted during 1923.* By W. H. KNOWLES, Esq., F.S.A.

Read 20th November 1924

THE town or settlement of ancient Aquae Sulis comprised an area of less than thirty acres. It was encircled on three sides by the river Avon, and almost surrounded by the lofty outliers of Cotswold and Mendip. The situation was an attractive one, and singularly appropriate for the important structures contained within the walled area. The baths occupied a central position in the town, and were in length at least one-third of its width from east to west.

After the depredations of Saxon and Norman masons, decay and the natural accumulations of mother earth speedily concealed the ruins. It was not until 1755, although from time to time referred to by historians, that the extent and importance of the buildings were realized. At that date the removal of the Abbey House revealed the easternmost portion of the bathing establishment, as recorded on a plan made at the time by Dr. Lucas¹ (fig. 4) and another plan by Dr. Sutherland in 1763.² These plans show the arrangement of the apartments during the last period of the Roman occupation, a goodly portion of which was unfortunately obliterated by the building operations that succeeded their disclosure.

Further discoveries were made in 1790 and 1822, but it was not until 1878 and the ensuing quarter of a century that the Great Bath and other apartments familiar to all visitors were revealed. During this period Major C. E. Davis continuously laboured with commendable energy and enthusiasm to lay bare the work as we now see it, and it is to be regretted that as city architect he should in turn have overbuilt and obscured so much of his own discoveries.

THE EXCAVATIONS

The site of the Roman work first disclosed in 1755 is that which has been recently excavated. On it in 1763 a set of baths was erected by the then duke

¹ *Essay on Waters*, by Charles Lucas.

² *Attempts to Revive Ancient Medical Doctrine*, by Alex. Sutherland.

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of Kingston. These buildings, obsolete and dilapidated, the city corporation determined to remove in 1924, and on the suggestion of the Chief Inspector of Ancient Monuments I undertook the direction of the work when demolition had reached the depth where ancient work might be expected. The operations have been difficult, as the foundations of the Kingston Baths were built in cement and carried to a considerable depth, the general floor-level of the Roman work being 16 ft. below that of the present street. I have not made separate plans of the

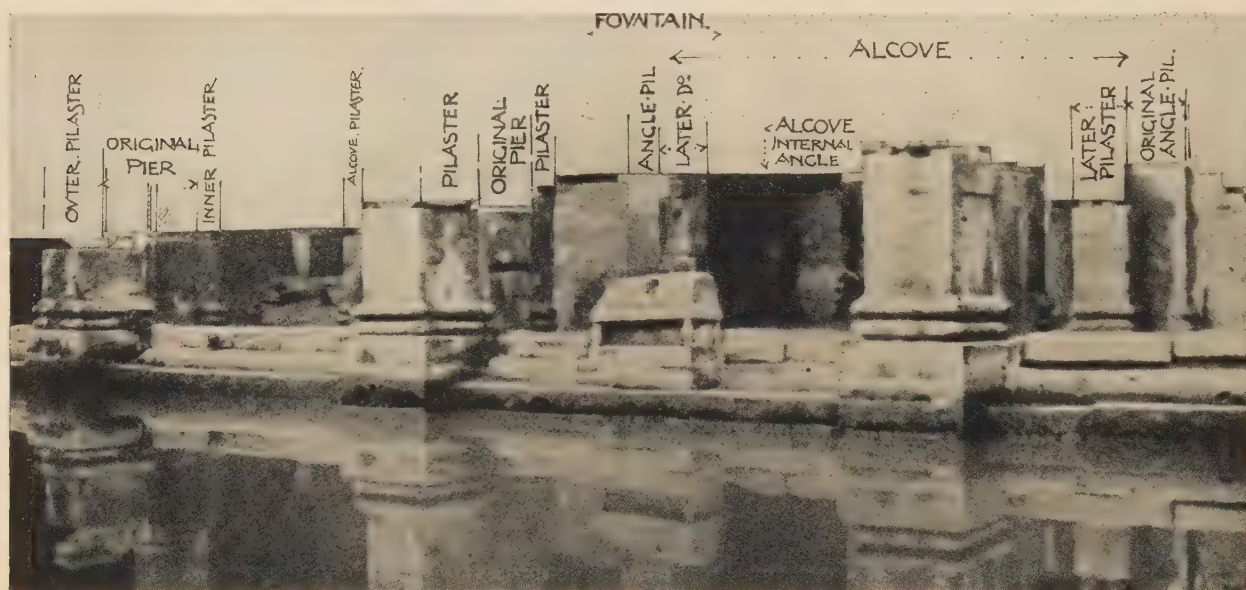
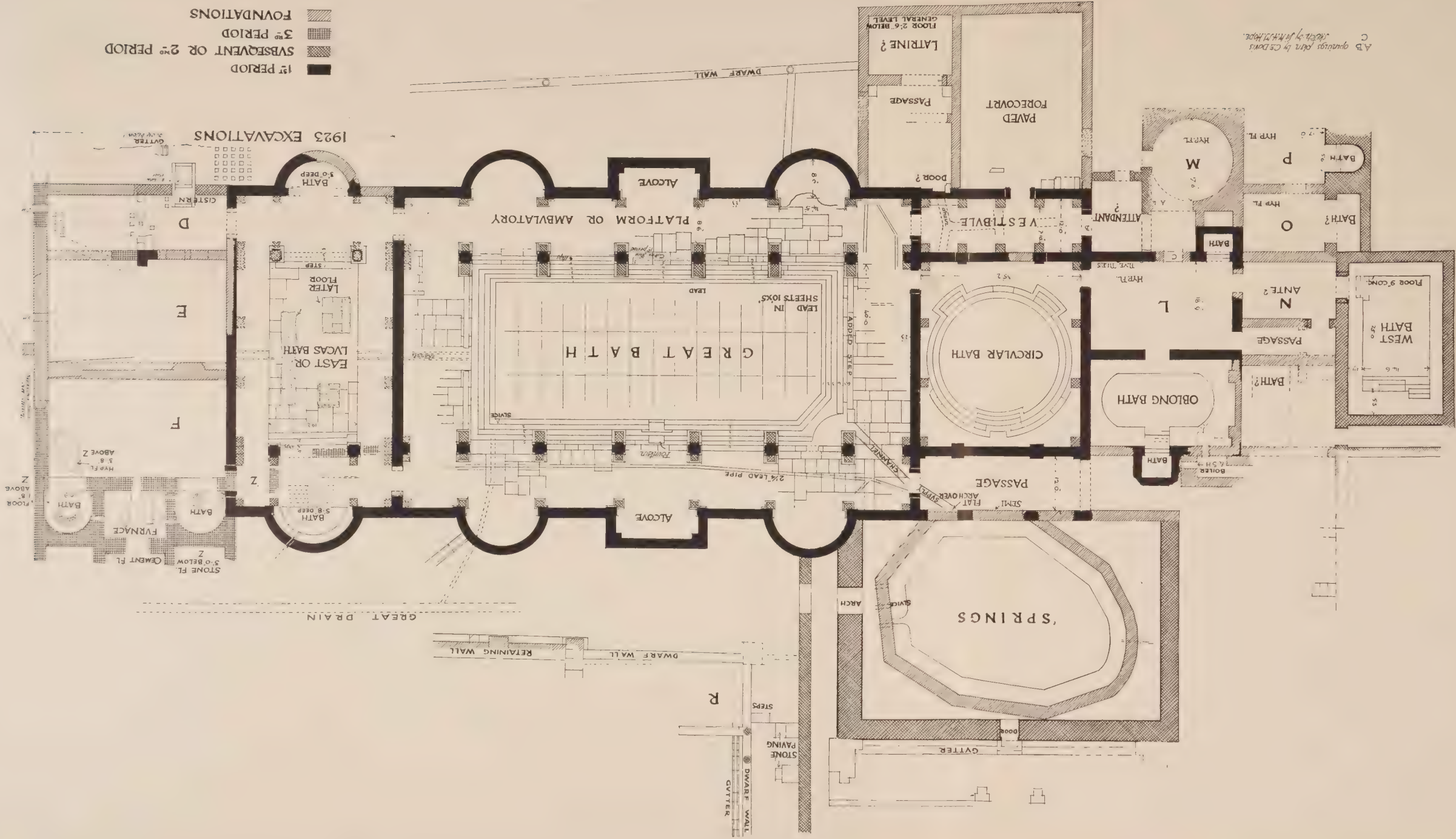


Fig. 1. View of north side of Great Bath.

excavated area, but have incorporated the results in a general survey of the whole range of bath buildings. The latter I was induced to attempt because, first, some of the features of the newly excavated swimming bath named the East Bath (pl. 1) will be more easily understood by reference to the Great Bath, and secondly, the plans heretofore published of the whole of these important buildings are inaccurate in several details, and omit obvious items which go towards the elucidation of the use of the place.

The recently discovered buildings are to remain open to view. They comprise a swimming bath belonging to the first building period, with its major axis to the north and south, being at right angles to the axis of the Great Bath; and, yet farther to the east and occupying an area equal to that of the swimming bath, a number of apartments erected at three successive building periods.



THE ROMAN BATHS AT BATH: GENERAL PLAN

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The apartment containing the swimming bath measures on the interior 68 ft. 6 in. from north to south by 34 ft. 3 in. from east to west (pl. 1). It was divided longitudinally into five bays by projecting pilasters. Transversely between the first and fourth pilasters were two large square piers. The basin corresponded in length to the three central bays. The area of the outer bays, between the piers and the end walls, divided the swimming bath from two apsidal baths which projected beyond the end, or north and south, walls. The area served also as a passage between the buildings on either side, being a continuation of the similar feature in the Great Bath. The walls enclosing the basin were built between and abutted on the interior face of the plinth of the piers.

The various piers and pilasters shown on the plan (pl. 1) are at least of two dates; only the four piers and the pilasters enclosing the angles of the apsidal baths belong to the first period (pl. 11).

The four piers (pl. 11) are of similar design to those of the Great Bath (figs. 2 and 3); they are built up of stones 2 ft. 11 in. by 2 ft. 8 in. on plan, with rebated angles 4 in. deep. The two outer faces form pilasters and have moulded bases returned into the rebated spaces, and stopped against the inner side jambs which are without mouldings. The plinths are continued to the level of the floor of the basin (fig. 2).

Pilasters with moulded bases of the same date as the piers enclosed the angles of the apsidal baths. Their position is not exactly in rear of the piers, as the distance between the latter is less than the width of the apsidal baths.

The basin 43 ft. by 19 ft. 2 in. is 6 ft. deep. Only the north wall exists to the full height: it is built of excellent masonry similar to the plinths of the contiguous piers. In the structure of the wall three massive stone steps are incorporated (fig. 2). No doubt similar steps occurred at the south end, where only one now remains. The side walls were formed of small stones in courses coated with cement. The floor of the surrounding platform, carried to the edge of the basin, was composed of large rectangular stones 8 to 10 in. in thickness. The floor of the basin was paved in like manner, covered with a layer of cement, and overlaid with heavy sheets of lead about half an inch in thickness. A slight fragment of the lead is to be seen at the north-west angle.

The water to the basin was supplied from the Great Bath on the western side, and the outlet provided in the opposite wall. Both inlet and outlet consisted of long, deeply hollowed channel stones 19 in. by 15 in. (fig. 2). The means of regulating the admission and outflow do not now exist nor does the cover of the channel stone.

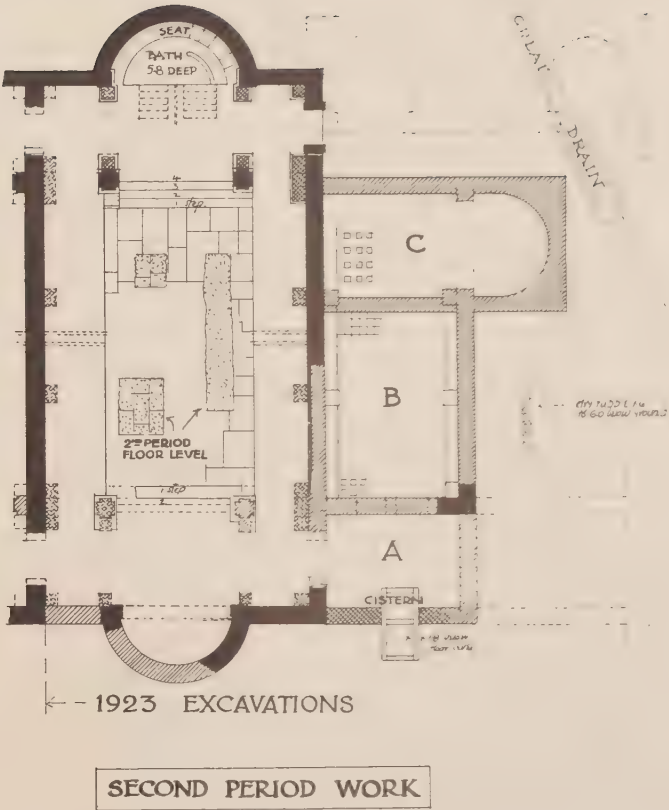
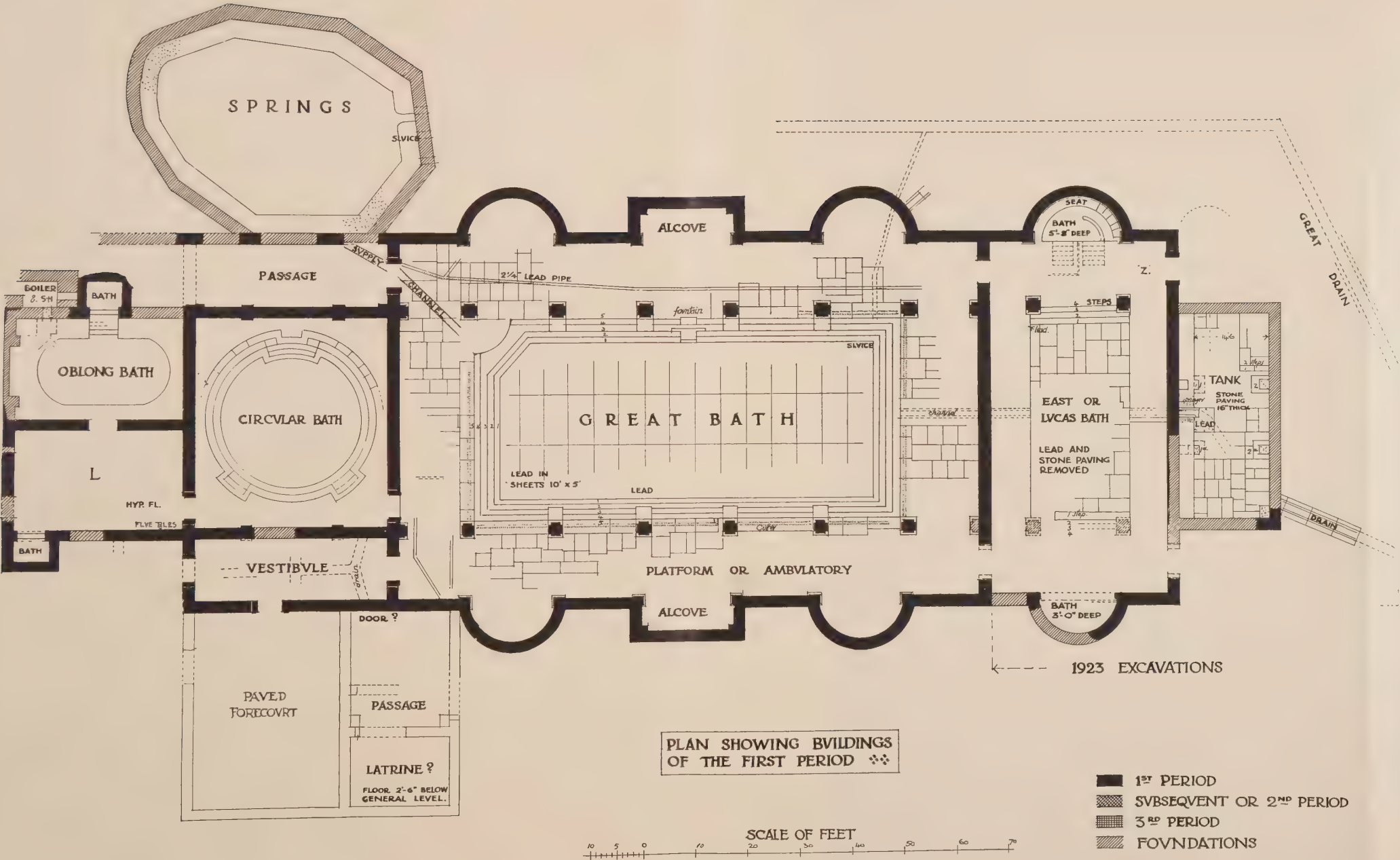
The northern apsidal bath was 17 ft. across its base, and 5 ft. 6 in. in depth

(see section fig. 2). It was furnished with a seat of built-up ashlar, the lowest course being a projecting ovolo, and the upper a thin shelf with a rounded nosing. The paving is of thick flagstones. The outlet for emptying the water is worked in the ovolo. Only the two lower steps remain. On the 1755 plan (fig. 4) six are shown divided by a mid-wall, on the top of which was a sinking in continuation of the floor channel proceeding from the Great Bath. Above the seat-level the walls were thickly coated with a double layer of cement.

The southern apsidal bath was of much simpler construction: the interior walls and floor—without seat or visible stonework—were coated with cement with the usual ovolo at the intersection. No steps now exist: they are indicated on Dr. Sutherland's plan as similar to those in the north bath, although the depth of the south bath is only 3 feet as compared with 5 ft. 6 in. of the northern one.

Fragments of the massive jambs of an entrance door, afterwards built up, still exist at the east end of the north passage or platform (see pl. II and fig. 2) and another is indicated on one of the early plans at the opposite end. There can be little doubt as to the existence of similar openings at either end of the south passage, thus providing convenient communication with the eastern and the western sections of the complete establishment.

Adjoining to and contemporary with the building of the swimming bath was a large oblong tank or reservoir (pl. II), measuring within the walls 39 ft. 9 in. by 14 ft. 6 in. by 7 ft. deep. At the time of its erection (pl. II) it was inaccessible from the interior of the swimming bath, and the tank was without platform save for a narrow walk on the west side 2 ft. 9 in. in width. The walls on the interior were faced with ashlar in narrow courses coated with cement. The eastern wall was strengthened by two buttresses projecting into the interior of the tank, fig. 2 (2, 2*a*), formed of a large footing stone, 3 ft. 6 in. by 2 ft. 4 in. by 1 ft. 3 in., and over it another, 2 ft. 10 in. by 1 ft. 10 in. by 3 ft. 10 in. in height. On the opposite or west wall were buttresses of less projection incorporated with the side walk (pl. II and I and 1*a*, fig. 2). The floor is a very solid one of stones 15 in. in thickness. It was covered with heavy lead, of which a portion is to be seen below the projecting inlet water channel (fig. 2). In the north-east corner the flooring stones do not occur; instead is some shallow masonry suggestive of a platform or steps. In the west wall by the side of the water channel (sections fig. 2) are two splayed springer stones, apparently of an arched cover. The outlet drain for emptying the water was a massive construction at the south-east angle, and consisted of flooring stones 5 ft. by 3 ft. 6 in., rebated on the edges to receive the side stones of similar length by 2 ft. 10 in. in height. The manner of covering the drain is not apparent. A built-up stone pier in the



THE ROMAN BATHS AT BATH: PLANS SHOWING BUILDINGS OF THE FIRST AND SECOND PERIODS

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south-east angle of the tank near the drain outlet may possibly have carried some portion of the mechanism for discharging the water.

As to the purpose of the tank, certainly the intrusion of the buttresses on the interior and the absence of an appropriate platform or steps preclude the idea that it could have been used as a bathing or swimming bath. With greater probability it served some practical purpose, the large solid stone blocks forming the buttresses being intended not only to strengthen the walls, but to carry beams or to support some mechanical appliance.¹

Both bath and tank belong to and formed part of the earliest group of buildings erected on the site; they are shown on pl. II in conjunction with the Great Bath and the Circular Bath, with which they are to be associated. The subsequent development of the whole will be considered later.

To continue the record of the excavated portion, the first change in the details of the plan of the swimming bath was made by the addition of a number of wall pilasters (pl. II, second period work).

In the Great Bath a like addition was made to the first structural piers, where the reason for, and the manner of, execution are quite evident. Briefly stated, in the Great Bath only the platform or ambulatory was roofed in the first instance, and was carried on the basin side by the central portion of the piers (fig. 3). Afterwards a great brick and tile vault was thrown over the basin, and was supported on an addition to the piers on the basin side; further to strengthen the piers they were increased on the platform side, and corresponding pilasters added exactly to the rear of them near the angles of the circular and square alcoves (fig. 1).²

Whether the space about the basin of the East Bath was also unroofed at first it is impossible to say. Nor does it appear that the numerous pilasters described below were added long after the first design was carried out. Indeed it is even possible that they were the result of an alteration effected almost before the completion of the first conception. Clearly no foundation below the floor-level was provided to receive the pilasters, which were clumsily executed. Their base mouldings are set at irregular levels and no attempt was made to join or mitre them with the adjacent bases in a workman-like way.

Pilasters opposite to and of similar width to the piers and two intermediates were placed on the east and west walls. Others combined with the piers on the passage side had corresponding pilasters immediately to their rear near the angles of the apsidal baths (pl. II), intended to receive arches or beams.

¹ A reservoir of similar plan is represented in Mau, *Pompeii*, ed. 1899, p. 226.

² It will be noted that the original angle pilasters are not precisely opposite the piers, and were consequently unsuited to receive the necessary arch or beam at the point.

Yet more though smaller pilasters were added in the interior angles of the passages, and of the central area occupied by the basin. The continuous base moulding for the pilaster opposite the east pier and of the two adjoining angle pilasters will be observed at *c* on fig. 2.¹

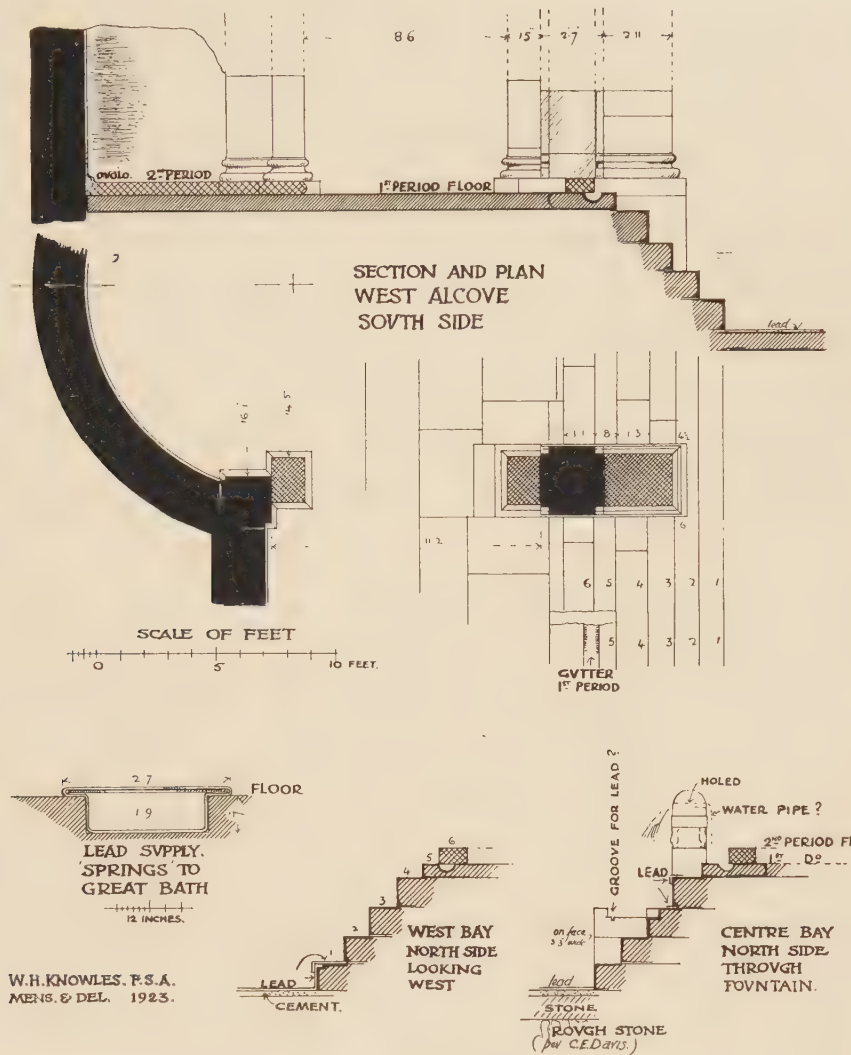


Fig. 3. Details of Great Bath.

In the Great Bath are fragments of the barrel vault which spanned the area, but nothing has been found during the present excavations to suggest how the East Bath was roofed or the manner of lighting it.

The first change to be effected in the contiguous area was the filling in of the tank or reservoir to a height 3 ft. below the general floor-level. The lead

¹ A coin of Hadrian was found adhering to the underside of one of the fallen added bases.

covering the original floor was removed, and the water inlet and outlet connected by a drain with walled sides indicated by dotted lines (pl. II, first period and fig. 2). The filling, 4 ft. in height, to receive the new floor was composed of large stones, laid roughly in courses, set on edge.

At the north end of the east side (see pl. II, second period work) the upper portion of the tank wall was taken down, and a spacious semicircular projection erected, with pilasters at the opening. The extent of this addition was dictated by the proximity of the great drain, which is at a higher level than that of the hypocaust floor. In line with the south side of the apsidal projection a wall was continued westwards across the tank space forming the chamber C. The concrete floor, 6 in. thick, passes over the reduced tank wall into the extension. Above the remainder of the tank area, B on plan, the floor was narrower by 16 in. on either side, the cement forming it being upturned on the face of a dwarf wall (fig. 2, transverse section) forming a seat, a bench to carry walled box tiles, or an indication that for a short period the enclosed space may have been used as a shallow tank or bath, suggested by the presence of floor tiles at the north end, although there are no indications of water service at the level to support the idea.

A floor at the same level also covers the narrower area A, enclosed by thin walls resembling the tank masonry, being a continuation of the south wall of the tank and the south wall of the swimming bath. The floor was not the *suspensura* of the apartments, of which there is no indication, but that to receive the hypocaust *pilae*, which are of 9 in. by 9 in. tiles with wide joints, excepting at the north-west corner of chamber C, where are solid channels or flues much charred by fire. The furnace, it is reasonable to assume, was contiguous to the solid flues, the later furnace being near it and the position being apparently convenient for fuel storage. Openings were broken through the south wall of chamber B for the passage of warm air. There is no floor or *pilae* at the level in the area immediately to the north and east of chambers B and C, excepting at the north-west corner of C. East of B was found a rough dry wall where indicated on plan, 1 ft. 6 in. to 6 ft. below the floor-level, scarcely strong enough to be regarded as a retaining wall.

Only a few courses of stonework remain of the apsidal projection, and of the wall across the tank in continuation of its south side. The extent eastwards of the southern chamber A is not apparent. It may in the first instance (there are slight indications of footings to justify the suggestion) have corresponded with the width of apartment B. In it is a stone cistern 8 ft. by 4 ft. on the interior; the sides, 6 in. thick, are V-grooved on the beds and vertical joints to receive cement. The cistern had a central stone division, half of it projecting beyond the walls of the chamber (pl. II); there is no opening for water inlet,

outlet, or overflow, but these may have been worked on an upper course.¹ The bottom of the cistern is 20 in. below the floor-level just described. Unless the hypocaust of A was shallow, the cistern must have been a deep one. Possibly, if the area was used as suggested below, this portion was at the outset without a hypocaust when used in conjunction with B and C.

The arrangement of the rooms is unquestionably that of a typical sudatory bathing-place on a small or preliminary scale, the southern chamber A with its cold cistern serving for apodyterium,² the middle chamber B for tepidarium and the northern for caldarium, with labrum in the apsidal space, and an oblong bath at the west end near the assumed position of the furnace.

The alterations which followed on those just described extended the similar accommodation to double the area, and formed the third building period (pl. 1). Of the northern portion sufficient remains to determine the details of the design, but unfortunately such is not the case with regard to the southern section.

The space enclosed within the external walls measures approximately 90 ft. by 40 ft. It was divided into three oblong apartments, D, E, and F (pl. 1), and opening off the latter was an apsidal bath on either side of a large central furnace.

Here as elsewhere, when alterations were effected in Roman buildings, the old structures were dismantled and the site levelled over. About chamber F the operation resulted in raising the height of the new floor, to receive the hypocaust pilae, 2 ft. above the similar floor of the second building period (fig. 2, transverse section). Yet, strangely, there is a floor to the western apsidal bath with pilae at the second or lower building level.³

At the outset the discovery of the constructions at the lowest level suggested that there had been two building periods, of identical design to the third period. Excepting, however, as previously mentioned, at the north-west angle where the second period hypocaust floor is continued to the wall of the apsidal bath, about Z on plan, there is no evidence of walls, floors, or pilae which can be associated with work at the lower level. Instead, therefore, of two periods it would appear that the occurrence is evidence merely of a false start on the enlarged scheme, which required adjustment to the levels of the great culvert which traverses the north-east angle of the chamber (pl. 1).

¹ See illustration of similar cistern found at Corstopitum, *Arch. Ael.*, 3rd ser., ix, 248.

² In the hypocaust built over the spot is a stone with a pierced arch resembling the recesses allocated for clothing in the apodyterium at Chesters. Dr. Bruce's *Handbook to the Roman Wall*, 3rd ed. (1885), p. 99, and plan of similar building at Aesica, *Proc. Soc. Antiq.*, xvii, 32.

³ In the western bath the pavement at the lowest level is of 'variegated rows (squares) of pebbles and red bricks' as mentioned by Dr. Lucas.

The exterior walls of the third building period on the north and east sides are 3 ft. 6 in. to 4 ft. in thickness, much stronger than the earlier work. On reference to the plan (pl. 1) it will be observed that the north wall does not line with that of the east, the Great, or the Circular Bath, but is midway in the width of the north passage or ambulatory, and effectively blocked the door leading therefrom, which was accordingly built up. The eastern wall was carried over the great drain on a flat segmental relieving arch. The western half of the wall dividing the first and second apartments E, F was built on the hypocaust floor of the second period. The foundations of the walls of the long narrow apartment D to the south were much deeper.

The chamber F measures between the walls 39 ft. 6 in. by 21 ft. 6 in. A portion of its floor remains at the north-east corner, 10 in. thick, supported on rather attenuated pilae formed of 9 in. by 9 in. tiles with thick mortar joints. On the north side two apsidal baths about 11 ft. at the base, and 9 ft. to the crown opened off the chamber. In the eastern one the floor is 18 in. below that of the chamber, and was covered with a tessellated pavement, a goodly portion of which remains in the curved portion of the bath. The pattern of the border comprised a number of concentric rings of small stone and slate blocks with an inner margin of alternating black and white blocks arranged in a triangular pattern.¹ Broken fragments of like design and at the same level occur in the western bath. The walls are covered with cement in two layers, and at the junction of wall and floor is the usual quarter-round skirting.

Between the baths is a furnace of ample dimensions with walls for the support of boilers and tanks, and openings to the chamber F with side ducts carried below the baths. The side walls of both furnace and baths were continued northwards, and afforded storage room for the necessary fuel. There was considerable charcoal deposit in the area.

The second apartment E is the same size as F. Over the eastern portion there is much disturbed and decayed concrete, indicating the hypocaust floor as lower than that of chamber F. In the eastern wall are some charred masses of masonry about supplementary stoke-holes.

The third chamber, D, was a long narrow one—it measures 39 ft. 6 in. by 12 ft. The existing hypocaust floor is at the level of the second period over the tank; at the eastern end is a stoke-hole, with a quantity of pilae including re-used material, among which is the pierced arched stone already referred to. The cistern, previously mentioned when describing the second building period, is at too low a level to be related to the period under consideration.

The arrangement and details of the apartments D, E, and F are conclusive

¹ The pattern, if it was alike in both baths, does not agree in design with that shown in *V. C. H. Somerset*, i, p. 256, fig. 30, and assumed to belong to the western bath.

as to the sudatory accommodation provided alongside the purely thermal establishment which was the origin of the place. The chamber D represents the apodyterium, E the tepidarium, and F the caldarium.

Before leaving this section attention should be drawn to Dr. Lucas's plan made in 1755 (fig. 4). Although the precise details may be doubtful, the position of the wall dividing the two hypocaust apartments is confirmed by the slight

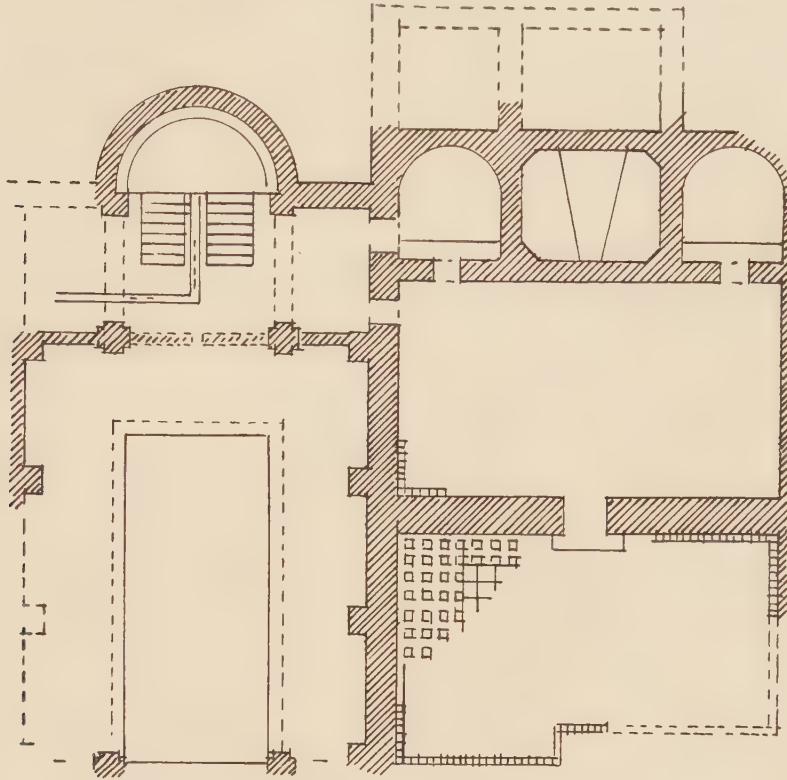


Fig. 4. Dr. Lucas's Plan, 1755.

remains now left. On Dr. Sutherland's plan (1763) the walls of the chambers are shown lined with flue tiles.

We have seen that, by the erection of the buildings covering the eastern half of the excavated area, the east door of the northern passage of the east swimming bath was blocked; consequent on this some modifications were made, which included the building up of the openings between the northern piers of the East Bath, as shown on plan (pl. 1). It is not, however, certain to what height those walls were carried; that is, whether they were high enough to shut off communication between the passage and the basin, or merely dwarf walls, although a built-up stool at the north-west angle of the basin (pl. 11, second period, and transverse section, fig. 2) suggests a means of access to the steps after the closing in of the north end.

Either at this or at some other period, the depth of the basin was decreased 2 ft. by the formation of a floor of concrete, 6 in. thick, over a solid filling of debris. At the time, the lead covering the basin as first constructed was removed, and, a rather interesting occurrence, a goodly portion of the heavy flooring stones was removed; see the plan (pls. I and II) where the remaining flooring stones are indicated. The stones or lead were re-used to cover the raised cement floor on which the impression of their size and shape is to be observed.

On Dr. Lucas's plan (fig. 4) the swimming-bath is shown much shorter, the platform being carried across the north end of the basin within the piers. There is now no evidence of this curtailment. Dr. Sutherland's plan shows the shortened bath, and also at the south end an apsidal bath similar to that at the north end, apparently by conjecture only, as it is both smaller and shallower.

It should be noted that the evidence is not conclusive as to the limits of the establishment. To the east and south beyond the walls of the excavated area are floors and pilae of unknown extent.

GENERAL SURVEY

That we may understand the original design of the bathing establishment it will be necessary, very briefly, to examine the accommodation as shown on the plan (pl. I). Of the numerous baths of varying size and shape five at least were intended for swimming, and the remainder are large and deep enough for the immersion of several bathers at one time.

It is not possible with certainty to determine a strictly chronological plan showing the sequence of the erections of the various parts, but it may be reasonably affirmed that the earliest buildings (see pl. II) included the large swimming or Great Bath, the East Bath and the tank recently excavated, the Circular Bath, with the passages north and south of it, and the reservoir enclosing the springs. Probably some of the chambers immediately to the west of the Circular Bath are contemporary with it, and only the alterations or parts obviously of later date have been so indicated on the plans. Essentially the largest and dominant feature of the whole is the Great Bath, with its huge pond and colonnaded ambulatory; from it access was afforded on the east to the East or Lucas Bath, the great tank and sudatory baths beyond, and on the west to the Circular, the Oval, and sudatory baths.

On the interior the Great Bath measures 111 ft. 4 in. by 68 ft. 6 in. It is divided into seven bays by massive square piers placed on the edge of the pond or basin which they enclose. The space to the rear of the piers forms a platform or ambulatory surrounding the pond. On the north and south sides there are one square and two apsidal projecting alcoves. Only the side ambula-

tories and the alcoves were roofed during the earliest building period. The central area over the basin was vaulted over at a later date. Originally the sides of the basin were formed of five steps, the topmost with a channel on the edge (see fig. 3). At a later date a new floor was needed and added to the depth of the basin, the outer stone of the platform covering the water channel of the first period.¹

To the east of the Great Bath was the East or Lucas Bath, already described in detail, with its platform on the north and south in continuation of the similar feature of the Great Bath. Farther east, and at a later date, was erected the large sudatory bath which blocked the northern ambulatory but not the southern, which afforded a convenient entrance and communication thereto.

To the west of the Great Bath is the Circular Bath, 32 feet in diameter, with moulded coping and descending steps at three points. The apartment in which it is placed is 40 ft. by 35 ft. 2 in., relieved on the north and south sides by pilasters worked in stones the thickness of the wall. On the east and west sides are added pilasters, the mouldings of their bases of finer section than elsewhere. On three sides there is little margin between the walls and basin; on the fourth, the south, is a broad platform with a door at both the east and west end, the former opening off the Great Bath, the latter communicating with the apartments beyond.

North and south of the Circular Bath are corridors or vestibules, in continuation of the north and south ambulatories of the Great Bath. The southern vestibule opens off a large paved forecourt, and has door openings into the Great Bath and the apartments to the west. Subsequent to the first construction this vestibule was divided into four bays by stunted pilasters with chamfered

¹ The floor of the basin, which measures about 73 ft. by 29 ft., was of large stones covered with thick lead, in sheets about 10 ft. by 5 ft. bedded in cement. The edges of the sheets were not lapped but merely butted, and were apparently united or run together with a hot tool. It is uncertain whether the steps were covered with lead: the meagre evidence of such does not bear out the theory. One instance of the presence of lead about the steps appears at the north-west angle where is the inlet from the springs, and where a certain provision may have been made, by way of an apron piece, to receive the constant flow of water.

The other fragment of lead above the floor-level is about a fountain placed midway in the length of the north side, and here again the provision seems to be where running water occurs (fig. 3). The fountain is 3 ft. 3 in. by 1 ft. 7 in. on plan by 3 ft. 3 in. in height (fig. 3) adorned with small pilasters and now worn to a rounded shape on top, although once carved with animals (see the Corbridge Lion on coping of a tank, *Arch. Ael.*, 3rd ser., iv, 205). It is pierced by a hole from back to front conceivably to receive a pipe from which water was spurted into a trough or shelf below, and fed from the 2½ in. lead pipe passing down the northern ambulatory—possibly fresh cold water for the use of the bathers.

The water supply between the springs and the bath was of boxed lead (shown in section fig. 3). The outlet for emptying the bath was by a bronze sluice at the north-east angle of the basin, over which was a grated overflow, both discharging into the great drain.

bases and moulded capitals. In the northern corridor pilasters of slight projection occur, worked on the same stone as the similar feature towards the Circular Bath, and enriched by flutings filled with caplings. On the north wall of this corridor are portions of two stone arched openings.

The remaining buildings to the west of the Circular Bath are wholly below the floor-level, and incorporated in the foundations of modern structures. Notwithstanding that much has been destroyed it is possible to determine the design of the apartments.

Immediately to the west and opening out of the Circular Bath is a large chamber, L on plan (pl. 1), and an oval bath. Together they conform to the design and symmetry of the plan inclusive of the Great, the East, and the Circular baths, and may be considered as contemporary therewith. The chamber L measures 31 ft. by 19 ft. The walls were jacketed with flue tiles, and the floor was of unusual thickness, being pierced by horizontal flue tiles and carried on tiled pilae. In the south-west corner is a small bath with steps descending to it. The stoke-hole or furnace was to the south.

Opening off this chamber was an oval bath, the walls coated with cement, and the side walks of stone with square nosing to the basin. The outlet for emptying the bath is at the north-west corner, where is a large drain discharging to the west.

In the centre of the north side is a small bath, the steps to which are somewhat awkwardly contrived. The water for this bath was heated by a small boiler placed in its west wall over a fire-hole, both openings being spanned with a double ring of arched tiles.

Whether or not the oval bath is contemporary with the circular one, it may reasonably be inferred that a period elapsed between the erection of the Oval Bath and the buildings to the west of it. The alterations in the direction of the drain near the apsidal bath and its heating arrangement justify the inference.

The circular chamber M, 17 ft. 6 in. in diameter, to the south of L, was destroyed above the floor line in 1886, excepting the base of the stone door jambs on the east side. A sketch made at the time by Sir W. H. St. John Hope indicates an opening between the chambers L and M, and on a plan dated 1886 by Major C. E. Davis is delineated the connexion as shown on the plan¹ (pl. 1). Opening off the west end of chamber L is an ante-room N, which gives access to the West swimming bath, and it may be to the apartments O and P. Both have hypocaust floors and small baths at the west end, that belonging to the southern apartment being semicircular on plan with a stoke-hole below.

¹ *Guide to the Roman Baths at Bath*, C. E. Davis, 1890.

The West Swimming Bath measures between the walls 33 ft. by 20 ft. Steps occur at the east side and the north end. The floor is of concrete and the walls of brick, covered with thick cement. The stones forming the platform on the north and west sides are grooved and chamfered (fig. 5), on the two other sides they are square only. On the west side are a few courses of masonry above the platform-level covered with cement, and with the usual ovolo.

At the north-west angle of chamber L is a door opening into a passage, and in the south wall of the passage is a door giving on to the ante-room, and in the north wall a small bath. The work hereabouts has been much destroyed.

Before leaving this group of apartments the central position of chamber L should be noted; from it access to the apartments to the south and west of it is readily obtained, indeed, it seems to serve the purpose of a dressing-room or apodyterium to the whole. Alternatively the intercommunication of chambers L and M with its eastern entrance may suggest that instead of L being a possible dressing-room and M a sort of laconicum, this group was designed with M as the entrance or dressing-room and L the laconicum. This grouping is mere suggestion; there is insufficient masonry above the floor-line to afford any definite proof.

Beyond this point are indications on every side of yet more buildings. The bathing establishment may have extended east and west, but on the north and south was bounded by open courts or streets.

To the south of the Circular Bath is a large forecourt paved with stones and to the east of the forecourt a parallel area once divided by a lobby or passage midway in its length. To the north the floor-level was that of the adjoining area, but to the south it is 2 ft. 6 in. lower. The side walls are cemented. The drain which empties the Circular Bath enters this area at the north-west angle.

The long wall to the south of the Great Bath, but not quite parallel to it, was a dwarf one, with a massive flat coping on which, at the points indicated, are the base mouldings of circular columns, presumably an open screen or the exterior wall of a covered way or shelter.

Immediately to the north of the Circular Bath are the hot mineral springs encircled by a strong wall roughly oval or octagonal on plan, afterwards enclosed within rectangular walls, apparently conforming with the lay-out of the supposed

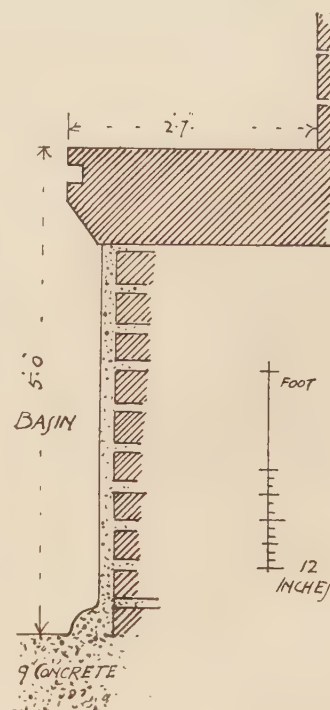


Fig. 5. Section through West Bath.

temple and other structures in the vicinity. The water-level has been artificially raised for modern use. On the east side of the outer enclosing wall is an arched opening with a broad stone sill, and near by the overflow water discharges into the great culvert. On the north side the outer wall is of excellent stonework, with a rebated door opening in the centre, and flanked at either end with masonry in the shape of huge pedestals; parallel with the wall is a deep channel stone, and at the entrance door two steps covering the drain at this point.¹

Opposite the entrance, about 10 feet distant, are two stone blocks that suggest a portico or a colonnade, but this is scarcely borne out on critical examination; the blocks are without base mouldings and of unusual shape for piers or pilasters. On the sill or floor stone by the side of one of the blocks is a socket-hole for a gate or railing standard.

It is not easy to make a careful survey of these features, visible only in the cramped space between the old and new floors, which is always charged with dense vapour rising from the springs. The pavement hereabouts is 16 in. in thickness and over 5 feet above the level of the Great Bath. It extends eastwards to a considerable area.

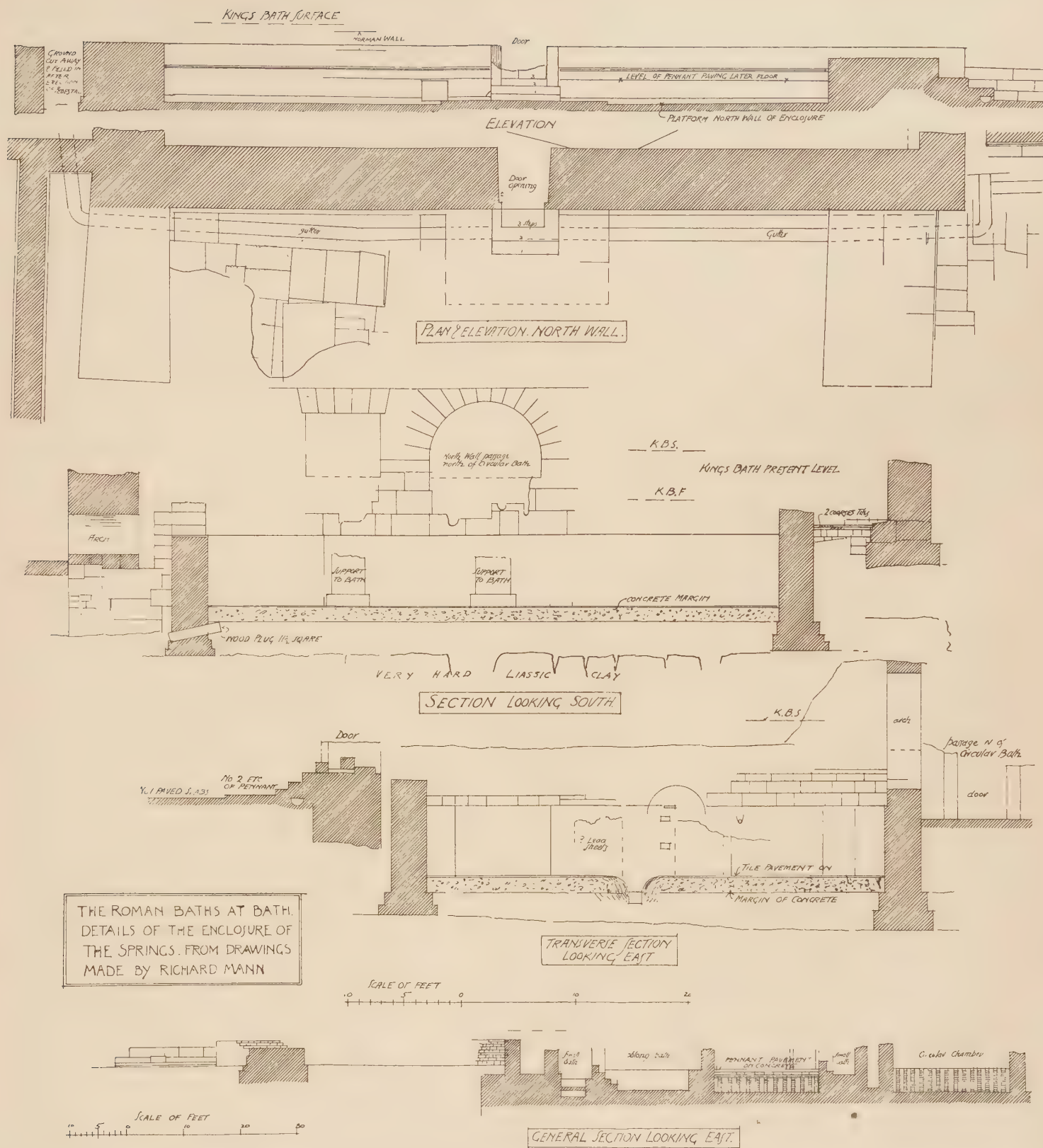
A buttressed retaining wall, to the north of and parallel with the Great Bath, sufficed to support the earthwork and massive pavement at the higher level. Surmounting this wall on its outer edge was a low parapet with square coping, on which rest the bases of circular columns. At the west end of the parapet wall another proceeded northwards, where was a covered way between it and the wall immediately to the east of the springs. The gutter-stones to receive the roof water of the covered way pass across an indefinite square area, R on plan (pl. 1), with broken pavement.

The whole of the northern area was apparently occupied by buildings of importance arranged about open spaces.

The cursory view in which we have indulged has enabled us to introduce a few new facts, eliminate others, and simplify the plan, which at the outset was skilfully designed, and afforded easy and direct communication between the parts (plan, pl. 1).

Unmistakably, the Great Bath was the common meeting-ground, the assembly place, or promenade. The grand entrance to it was the long vestibule approached from the ample forecourt to the south of the Circular Bath. The position is convenient and appropriate, and, but for the misleading title of 'latrines' on recent plans, would have been readily recognized as such; for except at the point suggested as the grand entrance, the Great Bath is not itself accessible without passing through the surrounding groups, an inconvenient and unthinkable arrangement.

¹ See Appendix and pl. III.



THE ROMAN BATHS AT BATH: DETAILS OF THE ENCLOSURE OF THE SPRINGS,
FROM DRAWINGS BY R. MANN

The north and south ambulatories of the Great Bath give naturally on to the East or Lucas Bath at the one end, and at the other to the Circular Bath about which again are grouped a series of small apartments, approached during the various developments from chambers L or M.

The corridor north of the Circular Bath may also have been used as an approach from the town on the north-west of the springs enclosure, where temples and other buildings were located; the only pilaster adorned with flutings occurs in this corridor. The difference in level could be easily overcome by steps or a sloping way.

I incline to the belief that the site of the latrines was the southern portion of the area to the east of the forecourt; its floor is 2 ft. 6 in. below the adjoining room and could be flushed by the discharge drain from the Circular Bath.

APPENDIX

EXPLANATION OF PL. III

Mr. RICHARD MANN, in the years 1875 onwards, made a number of drawings of Bath, now in the possession of the Society. Among them are sections of the 'springs' enclosure (see pl. III).

The work shown on the sections is now buried below the present reservoir. As the details have not heretofore been published, copies of the sections pertaining to the enclosure are now presented on pl. III, together with the extracts below from Mr. Mann's description.

'Whilst the reservoir was building, the water seems to have been provided with an out-flow at the bottom of its eastern wall. This aperture, a Roman foot square, was blocked up by an oak plug (see sections looking south and east). Excepting at this aperture, a margin of concrete, faced on its upper surface with tiles, was laid against the interior foot of the wall, which was built of block stone 3 ft. wide (see pl. II). Sheets of lead, varying in thickness from $\frac{5}{8}$ in. to 1 in., were footed into the concrete, laid upright against the face of the wall, turned in at the level shown in section (looking east) and several more courses of block stone fixed upon it. In very early times the upper part of this lead had been hacked off to the line shown in section. The removal of this remaining portion is explained by Major Davis in the first edition of the *Guide* thus: "Between 20 and 30 tons of this lead he removed as the sale 'furnished sinews' for the excavators." . . . Remains of stone pitching in the reservoir court were also found and still remain (plan and elevation, north wall). Portions of two square piers, probably Roman work, were found in position near the south wall of the reservoir. . . . Near the doorway (section looking south) [was] a portion of a later floor of the Forum, laid at a level 20 in. higher than the original floor. It is formed of thin pennant slabs. All were badly fractured (section looking east).'

DISCUSSION

Mr. BUSHE-FOX was glad to find that Mr. Knowles's removal from the North had not diminished his enthusiasm; and a description of the finest architectural remains of Roman Britain was very welcome. He distinguished between domestic baths in small buildings, military baths outside the forts, and larger establishments as at Wroxeter and Silchester for public amusement and intercourse, of which the baths of Diocletian at Rome were an

outstanding example. These at Bath had less than usual in common with the Turkish system, and comprised a large number of basins, which were not complete till the east wing was added. Something was known of their date as a great number of coins came from the large reservoir, the sacred spring of Minerva, and ranged from Vespasian to the end of the Roman occupation. The building was probably begun at the end of the 1st century. Bath covered only 20 or 30 acres within the walls, but drew a large number of visitors especially of the military class, every legion but the 9th being represented on the tombstones. Solinus in the 3rd century referred to the warm baths of Britain, which were ruled over by Minerva.

Mr. REGINALD SMITH recalled the mention of three periods in the paper, and asked whether any improvement or deterioration in the masonry was noticeable as additions were made to the first-century block. On many Roman sites buildings had been dated by the style of construction, the key being given by structures altered at successive dates. It was satisfactory to know that the finest Roman architecture in the country was under the protection of the Office of Works, and that any excavations on the site were carried out under expert supervision ; as private and municipal enterprise had had disastrous results in some other cases. He remembered seeing an interesting group of antiquities in the Pump Room museum, and hoped that a much older museum in the town would one day emerge from its eclipse.

Mr. WILMER dwelt on the connexion between baths and soap, and referred to Sir Flinders Petrie's theory that the Red-hills of Essex were prehistoric alkali works for soap-making (*Proceedings*, xxiii, 88). Inquiries at Pompeii had elicited the information that the bathers used not soap but fuller's earth.

Mr. CARÖE was interested in the Roman method of producing lead-piping. In the last few years research had proved that they fused the lead along the top of a clean straight joint, and there was some extraordinarily neat work at Timgad and Pompeii. The modern lead-turner left marks of fusing along the joint, but how the Romans obtained the necessary heat was a mystery ; and he inquired whether Mr. Knowles could throw any light on the method after his work at the baths.

The CHAIRMAN (Mr. Garraway Rice) said his acquaintance with Bath was confined to a week's visit with the Royal Archaeological Institute, but he had followed the paper with interest and profit, and returned the thanks of the meeting not only to the author but also to the Directors of the Springs who had kindly lent, to illustrate the paper, the large model of the baths till recently exhibited at Wembley.

Mr. KNOWLES replied that evidence of date was given by a coin of Hadrian, found adhering to the underside of one of the added bases of a pilaster. The earliest work was undoubtedly the best on the site, the latest being thicker and clumsier, and that of the interval being of mixed character. A quantity of fuller's earth was found on the floor of the swimming-bath, which it had been suggested was placed there for waterproofing purposes. The lead squares measured 10 ft. by 5 ft. and the joints were butted and fused : the large pipe from the springs to the bath was overlapped.